



The Effect of Cognitive Ergonomics and Effectiveness of Academic Staff in Selected Tertiary Institutions in Lagos State

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ABSTRACT

This study examines the effect of cognitive ergonomics on effectiveness of academic staff in selected tertiary institutions in Lagos State. A descriptive survey research design was adopted. The study population is four thousand two hundred and sixty- nine (4,269) academic staff in selected tertiary institutions in Lagos State. While a sample size of three hundred and sixty- seven (367) was drawn from the population. The study adopted a stratified and purposive sampling technique in selecting the sample from the population. The study found that there was a positive relationship between cognitive ergonomics and effectiveness with $R = 0.691$ and cognitive ergonomics indicators and their associated p-values for the indicator Attention ($\beta_{CE1} = .132$, $p < 0.011$); for Perception ($\beta_{CE2} = .468$, $p < 0.000$) and Memory ($\beta_{CE3} = .168$, $p < 0.003$). The results are statistically significant and can be used in predicting the performance of academic staff in selected tertiary institutions in Lagos state. The study concluded that cognitive ergonomics despite the ever-increasing information of the academic are required to process both the short-time or long-time ability to manipulate information, monitor it, and strategically use information retrieved in their memory through psychological components like attention, and perception, to contribute to their level of effectiveness and their performance. The study, therefore, recommended that the management should provide an effective framework in the ergonomics model that could promote competency and capability in the performance of academic staff and their environment.

KEYWORDS: Cognitive Ergonomics, Effectiveness, Performance

I. INTRODUCTION

Cognitive Ergonomics is concerned with mental processes, such as perception, memory, reasoning, and motor response, as they affect human interactions and other system elements. These are

relevant to mental workload, decision-making, skilled performance, human-computer interaction, human reliability, work stress, and training, as may relate to human-system design (International Ergonomics Association, 2017).

However, just as Amit, Nancy, and Laurel (2012) noticed in other organisations, the focus during the accreditation exercise does not take into consideration the interaction of humans with their workplace which may consist of identifying the relationship between job physical risk factors and physiological responses-cognitive ergonomics. But, the rapid migration to the automated workplace and project-based systems in the field of cognitive ergonomics and organisational ergonomics (OE) is recently gaining prominence.

Kalakoski, Selinheimo, Valtonen, Turunen, kapykangas, Ylisassi & Paajanen (2020) revealed that cognitive demands of work tasks cause cognitive load, which easily exceeds the natural limitations of human cognitive capacities, but strain may also be further increased by working conditions. The limitation to human cognitive capacities has become a major problem to most academics as most fail to realise it when they are determined to meet up with their work expectations and work schedule. These limitations coupled with some other working conditions – workplace design, long working hours, high quantitative demands, information and communication technology (ICT) demands, social support, good resources at work, qualification, and over-qualification, impaired cognitive performance, as identified in the research of (Cecilia, Stenfors, Gabriel, Töres, and Lars-Göran 2013; Couffe & Michael, 2017; Virtanen, Singh-Manoux, Ferrie, Gimeno, Marmot, Elovainio & Kivimaki (2009). Physical and cognitive ergonomics focus on improving individual employees' well-being and productivity, and also the ergonomics system as a whole.

Hence, this study aims to examine how cognitive ergonomics affects the effectiveness of



academic staff in selected tertiary institutions in Lagos State.

The study thus, tested the hypothesis:

What is the effect of cognitive ergonomics on the effectiveness of academic staff in selected tertiary institutions in Lagos State.

H₁: There is no significant effect of cognitive ergonomics on the effectiveness of academic staff in selected tertiary institutions in Lagos State.

H₂: Cognitive ergonomics does not have a significant effect on the performance of academic staff in selected tertiary institutions in Lagos State.

II. CONCEPTUAL CLARIFICATIONS

Let have a conceptual framework, theoretical framework and rename this area as literature review. The study variables – cognitive ergonomics, effectiveness and performance are critically examined in this section;

2.1. Cognitive Ergonomics

The word *cognitive* comes from the Latin *cognoscere* "to get to know" and refers to the ability of the brain to think and reason as opposed to feel (Vocabulary.com, 2018). That is, employees' cognitive development is the growth in their capability to think and solve problems or their mental process of knowing, including aspects such as awareness, and perception of processing information and using it.

However, most researchers like Bayne (2019); Jan, Yvonne, and Barnes (2016) accepted that the construct '*cognitive*' does not have a single, stable, well-behaved definition, Bayne (2019) believed that, though some definitions of '*cognitive*' may be better than others no single definition seems likely to cover all legitimate uses of the term. But, any definition of '*cognitive*' must involve a certain amount of stipulation as the quest for a definition might still be illuminating. The key to Bayne's (2019) view is not an attempt to say what '*cognition*' means, but an attempt to isolate the central and theoretically interesting features that lie at the heart of cognitive phenomena.

Jan et al, (2016) identified how pivotal the concept of "cognitive" is to modern-day psychology and empirical clinical psychology. Jan et al (2016) discussed two views on the nature of cognition. Firstly, cognitive psychology, where was explained in terms of information processing. Second, within functional psychology, where it was conceptualised in terms of behaviour. It must be noted that both perspectives are not mutually exclusive and they can be reconciled within a functional-cognitive

framework for psychological research that recognises two interdependent levels of explanation in psychology; a functional level that aims to explain behaviour in terms of elements in the environment and a cognitive level that is directed at understanding the mental mechanisms by which elements in the environment influence behaviour.

Also, Soman (2018) based on the work of Uma defined cognition as the study of how human beings receive, process, integrate, and respond to information. While, Jan et al, (2016) also identified the definition of Neisser as one of the most recent and influential description of the construct '*cognitive*' as stated below:

the term 'cognition' refers to all the processes by which the sensory input is transformed, reduced, elaborated, stored, recovered, and used. It is concerned with these processes even when they operate in the absence of relevant stimulation, as in images and hallucinations.

Irrespective of the perception of researchers' or stakeholders, one thing that is common in all their conceptualisations of the construct '*cognitive*' is information processing.

Thus, for this study, cognition or the adjective cognitive is conceptualised simply as a term for the processing of information and the use of the processed information. This conceptual identity is peculiar to this study for two reasons. One, it identified with just an aspect of the meaning of cognitive as shown from the different concepts stated earlier from the work of some researchers. Two, this study is limited according to the scope to how academics process information, acquire of knowledge and make use of the knowledge for lecturing or research purpose. Hence, this study limits the cognitive skill accessed to five. These are; sustained attention, which is the basic ability to look at, listen to and think about students' response over a period of time; response inhibition, which is the ability to restrain one's own response to distractions; speed of information processing, which refers to how quickly a learner can process incoming information; cognitive flexibility, which is the ability to change a line of thinking the mode of thinking and the subject of thinking – in other words, the ability to change one's mind; working memory, which refers to the ability to remember instructions or keep information in the mind long enough to perform tasks. While other skill like multiple simultaneous attention, category formation and pattern recognition and inductive thinking as identified by C8 Sciences (2018) are not considered.

Virpi, *et al.* (2020) identified with the definition of cognitive ergonomics by the Chartered



Institute of Ergonomics and Human Factors (2019), which described the construct as an intercession that centres on human factors and practices that aim to ensure 'suitable relationship' between work, product, environment, human needs, capabilities and limitations within workplace. The focus is on human cognitive functioning and the conditions affecting this, and on making human-system interaction at work compatible with human cognitive abilities and limitations. But because the work of Virpi *et al.* (2020) focused on knowledge-work office environments, they see cognitive ergonomics as a study of the factors that reduce the cognitive strain associated with working conditions. To Kim (2016), the importance of cognitive ergonomics mental workload, decision-making, skilled performance, human-computer interaction, human reliability includes work stress and training which relate to human-system design. Kim (2016) believed that cognitive ergonomics mainly studies cognition in work and operational settings in order to optimise human well-being and system performance. Thus, Kim (2016), like others, is of the opinion that cognitive ergonomics in the human system interaction utilises the developing knowledge from cognitive sciences on mental and information processes such as perception, attention, memory, decision-making, learning and how to understand the factors that affect cognitive function. Kim (2016) further explained that cognitive ergonomics is to elucidate the nature of human abilities and limitations in information processing. This means that the aim is to improve the working conditions with specific emphasis on health, safety and performance of the human factor such that human errors due to unnecessary loading that can cause cognitive stress and strain is reduced or avoided.

Based on variations in the conceptualisation of the constructs 'Ergonomics, Cognition and Cognitive Ergonomics' by the researchers identified earlier, this study defines cognitive ergonomics as the study of how the human brain processes information and the use of the processed information within knowledge-work office environments and operational settings in order to optimise human well-being, effectiveness and invariably, improved system performance. The use of this conceptual clarification is to simplify the Psychologist view from which most researchers tend to study cognitive ergonomics and reflect more on how the mental capabilities within the Working/Industrial Relations and Condition of the Human Resource can be better managed specifically

in a knowledge-based environment. Such view is limited to human well-being.

This is why the study identified five of the possible factors - Body Mass Index and Mental Stress, Attention, Perception, Memory-noticed in the research environment that could affect the cognitive function of the lecturers. However, the scope and objective of this study are limited to Attention, Perception, and Memory.

2.1.1. Attention

Kendra (2021) viewed attention as the capability to effectively process distinct information within any environment while at the same time putting out other details. Thus, Kendra (2021) believed that attentional resources need effective management due to capacity and duration limitations to be logical in any environment. McCallum (2022) described the construct as the process of concentrating on the existence of some specific happenings without regard to other possible stimuli. So, it is seen as a perceived method of bringing into focus the "Here and Now". In a psychology online lecture note from The University of Victoria (n.d.) attention is viewed as actions that improve some information and inhibit others at any given point in time. Such improvement allows further processing of some selected information by the human(s) within the system while some information is allowed to be set aside as a result of inhibition.

Though, from the National Institute of Open Schooling in India (n.d.) attention has four functions namely; alerting function, selective function, limited capacity channel, and vigilance function. The focus of this study will be on the last three functions, especially the second and third functions. This is because the focus of the study is on academics and not the students. A critical examination of a typical lecture environment in a Nigerian higher institution gives a better understanding of the reason above. For example, irrespective of the number of students in a class, the focus of each student is on the lecturer and the focus of the lecturer is most likely to be on more than one student during each lecture period. In Nigeria, like most developing countries, this number in most cases exceeds the National Universities Commission's recommended lecturer-to-student ratio. Hence, a need for an effective selective function (when the lecturer's attention is needed by more than one student for such activities as clarification and others for the lecturers to be able to cope, due to their limited capacity channel. The vigilance function is added because the number of



students increases far beyond the capacity. This can become monotonous as the volume of clarification on the subject matter increases. This means most academics in Nigeria are likely to experience an increase in cognitive function as a result of the required attention needed to cope with the ever-increasing student population, taking into cognisance the limited capacity channel. This shows the need to examine how the level of attention as an indicator of cognitive ergonomics has impacted on the effectiveness of academic staff.

2.1.2. Perception

Qiong (2017) cited many authors in his conceptualisation of perception, but this study focused on two: contemporary English and cognitive meaning. Qiong (2017) noted that contemporary English viewed it as an idea(s) that is developed by humans or the interpretation of an issue(s) as a response to what the sensory organ like sight or hearing, stimulates or its reception got from any system and the environment. To Goldstein and Brockmole {2016} as cited by Russell and Stacie (2020) perception could be seen as the capability of seeing, hearing, touching, and awareness of recognising, stimuli within a system and its environment while cognitive science conceptualised perception as the process of fulfilling a state of awareness or understanding of sensory information. This means that both concepts believed perception is an interpretation of sensation. The National Institute of Open Schooling India (n.d.) further noted that perception from sensation is not limited to the data stimulated from the immediate period alone but also from an element such as experience, knowledge accumulated, memory retention capacity, what motivates, and cultural background, the perception could also be an interpretation of attention.

Because academics are exposed to attending to the needs of more than one student (in most cases a large class i.e., a lecture class that doubles the recommended lecturer to students' ratio) simultaneously during each lecture period, the number of interpretations will likely increase

proportionally to the number of sensations that may be generated or stimulated. This is another indicator of cognitive ergonomics that may load the mental capability of academics and create a need to know how it affects their effectiveness.

2.1.3. Memory

Psychology (1965) noted the deplorable condition of how badly abused and poorly understood the word "memory" has been subjected to over the years. This assertion was recently collaborated by Brewin *et al.* (2019) and Sarah *et al.* (2022) among others. Psychology (1965) also observed that in the course of using the construct "memory" technically and quasi-technically, such related expressions as remembering, memories, memory trace, recall, retention, learning, and information storage, are muddled up ambiguously in several fundamental distinctions and not-so-fundamental metaphors. Three notable concepts of the construct were identified as follows;

Ross and Favela (2019) defined memory as *a process that carries information forward in time, preserved in a fashion that maintains its usefulness as an object to be computed for the system to which the memory is said to belong.*

Gregorio & Aaron (2019) observed the construct from different perceptions such as neuro-chemical processes, cognitive science, and information technology. simply defined memory:

As the capacity to store and retrieve information.

This study adopted the last concept as stated by Gregorio and Aaron (2019) because it can easily be related to the three main functions of academics such as teaching, research, and service. This means that academics, like other intellectual and knowledge-based professionals, need to possess the capacity to store and retrieve information for teaching and research at an acceptable time interval to be considered effective. This is shown in Figure 2.1 Thus, an examination of memory as an indicator of cognitive ergonomics will give an insight into its effectiveness and contribution, to the cognitive load academics are subjected to in Nigeria.

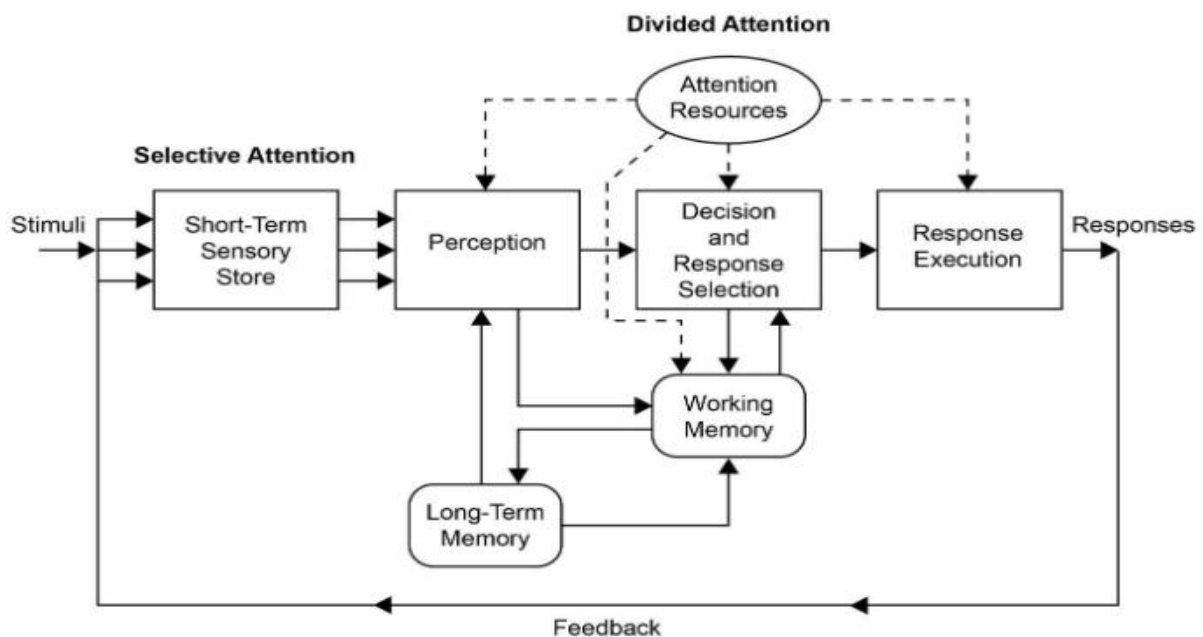


Figure 2.1: Human Information Processing Model

Source: (Russell and Stacie, 2020)

The model in Figure 2.1 above was used to illustrate the link between the three indicators of Cognitive Ergonomics-Attention Perception and Memory as identified earlier in this study. It is based on the Human Information-Processing model of cognition developed by Lee *et al*, (2017) as cited by Russell and Stacie (2020).

However, relating the model to a typical lecture room in Nigeria, a lecturer receives stimuli from students, environmental activities, and other possible sources through senses and analyses the characteristics of the stimuli. The lecturer simultaneously draws up knowledge and expectations from long-term memory (LTM) to process and combine it with sensory information to arrive at a perception. Thus, the perception springs up the lecturer's awareness of interpretation, and recognition of the stimuli within and around the lecture room.

Depending on the urgency of the situation, the perception of the lecturer could lead directly to selecting and executing a spontaneous action (as observed when a lecturer is giving answers to some questions students ask). But when time allows for reasonable thinking and manipulation by the lecturer (especially during research work or when a lecturer takes enough time before answering questions posed by students), the perceived information is combined with other knowledge in working memory (WM). WM contains information the lecturer is thinking about at any one time, including what is perceived

and activated from long-term memory. Because the WM is temporary, keeping information active in WM requires effortful attention. As it is attended to, operated on, and rehearsed, some of the contents of WM become encoded into LTM where it can be retrieved much later.

The essence of the scenario explained through the model in Figure 2.1 is that academics have a limited pool of cognitive resources, especially in terms of attention and working memory. Hence, the cognitive system of the academics can easily become overwhelmed, impacting the level of work efficiency, communication, and learning especially as the lecturer-to several students' ratio is heavily stretched. These problems could create high stress that could invariably impact the effectiveness of the lecturer.

2.2 Effectiveness

Employee effectiveness (EE) is associated with the enablement to attain set aims that are proportional to the immediate and long-term goal(s) of a firm. The firm's goal(s) may be directed towards enhancing productivity, developing a healthy workplace, and invariably improving revenue/profit.

According to Geyi, Yusuf, Menhat, Abubakar, & Ogbuke (2020), employee effectiveness is the ability of an individual to make a particular, aspiration effect with minimized costs and in exact compliance with primary requirements.



It is subjective in characteristic which means the degree to which chosen challenges are tackled and the extent to which the current goals and objectives are attained by the individuals within the system.

Geyi *et al.* (2020) further explained that EE could also be simplified as a scenario of an employee(s) that produce(s) a desired outcome in the best possible way and their output could be a parameter in the measure of effectiveness. This study adopted the last conceptualisation of effectiveness by Geyi *et. al* (2020) as it is the orientation of most stakeholders and researchers as identified by Matthew (2021). To Matthew (2021) EE is the ability of an employee to do what is right or produce, an acceptable outcome given a set(s) of input(s).

This study will adopt Matthew's (2021) description of EE as the ability of individual academic(s) to achieve quality output in terms of quality of research and quality of students' produce-ability the graduate to meet the recent challenges required by employers of Labour. This means the study will be able to examine how the present policies implemented in the selected institutions affect the attention given by academics to the production of their outputs-Published Research and Graduate Quality, their perception of the cause of

producing an output of this quality, and how the management policy(ies) helps their memory in information processing and retrieval to achieve the desired output.

2.2.1 Performance

Âta *et al.*(2017) from the Oxford English dictionary considered the linguistic form of performance, to be how well or badly something is done or how well or badly something works, it is also defined as the act or process of performing a task or an action. while the verb perform means to work or function well or badly.

However, researchers have discovered that no single or universally acceptable concept of performance exists and concluded that, it is a multidimensional concept (Âta *et al.*, 2017).

Tajana (2019 as cited by Âta *et al.*, 2017) noticed a common characteristic from all the different literature reviewed in their work. That is, all the definitions of performance measurements are related to two terms: effectiveness (the degree of goal attainment) and efficiency (the resources that were consumed to reach the level of achievement). Thus, Âta, *et al.* (2017) identified some definitions cited from Krause's (2005) work as shown in Table 2.1.

Table 2.1: Concepts of Performance

S/N	Author and Year	Definition
1	Venkatraman & Ramanujam (1986)	Is the time test of any strategy.
2	Cordero (1989)	Effectiveness (i.e. measuring outputs to determine if they help accomplish objectives). Efficiency (i.e. measuring resources to determine whether minimum amounts are used in the production of these outputs).
3	Lebas (1995)	Is about deploying and managing well the components of the causal model that leads to the timely attainment of stated objectives within constraints specific to the firm and to the situation
4	Neely <i>et al.</i> (1995)	Efficiency and effectiveness of purposeful action.
5	Rolstadas (1998)	It's a complex interrelationship between seven performance criteria: effectiveness, efficiency, quality, productivity, quality of work life, innovation, and profitability/budget and ability.
6	Dwight (1999)	The level to which a goal is attained.
7	Hoffmann (1999)	Describes an evaluated contribution to the attainment of organisational goals.



8	Andersen & Fagerhaug (2002)	Is sufficient to have reached a point where performance has replaced productivity and is generally accepted to cover a wide range of aspects of an organisation-from the old productivity to the ability to innovate, to attract the best employees, to maintain an environmentally sound outfit, or to conduct business in an ethical manner.
9	Hauber (2002)	Describes the contribution of specific systems (organisational units of differing sizes, employees, and processes) to attain and validate the goals of a company.
10	Wettstein (2002)	As the degree of stakeholder satisfaction.
11	EFQM (2003)	It's the level of attainment achieved by an individual, team, organisation or process.
12	Grüning (2002)	The ability of a company to achieve goals, i.e. meet expectations, and is therefore influenced by results in a wider sense, but also by the corresponding goal setting.
13	Krause (2005)	The degree of the achievement of objectives or the potentially possible accomplishment regarding the important characteristics of an organisation for the relevant stakeholders. It is therefore principally specified through a multidimensional set of criteria.

Source: **Áta, Chafik, Razane, & Elalami, Performance (2017)**

Since the main objective of ergonomics is to improve the performance of both employees and the organisation as a whole, as identified earlier, the study must examine the concept of employee performance.

2.3. Theoretical Framework

The hypotheses based on the Information Processing Theory involved the use of computer processing as a metaphor for the workings of the human brain, which was used to evaluate the effects of cognitive ergonomics and the effectiveness of academic staff. According to Caroline (2019), Information processing theory is a cognitive theory Initially proposed by George A. Miller and other American psychologists in the 1950s, the theory describes how people focus on information and encode it into their memories. Information processing also talks about three stages of receiving information into our memory. These include sensory memory, short-term memory, and long-term memory.

George Miller developed the information processing theory by comparing it to a computer model. According to him, learning is changing the knowledge stored by an individual's memory. Information processing is an analysis of a fixed pattern of how the human mind/ brain learns something new. The information processing theory is based on the idea that humans actively process the information they receive from their senses like a computer does. Learning is what happens when our

brains receive information, record it, mould it, and store it.

III. RESEARCH METHODS

This study adopted descriptive research designs. The study population is four thousand two hundred and sixty-nine (4,269) academic staff in selected tertiary institutions in Lagos State. While using Yamane (1969 as cited by Anokye, 2020), a sample size of three hundred and sixty-seven (367) was drawn. The sample was stratified as shown in Table 3.1 such selected institution was represented. As identified earlier in the study, scope, and limitation, the convenience sampling technique was used to choose Lagos State because of accessibility and proximity, cost, and time constraints. While purposive sampling techniques were used in each stratum to elicit information from those willing, relevant to the objectives of the study, and will return the questionnaire within an acceptable time.

A five-point Likert-scaled questionnaire was designed for data collection to establish how employees' performance and health are affected by ergonomics in the academic environment. Copies of the questionnaire were taken to the office and distributed to the staff with minimal persuasion or posted online through emails and other relevant social media within four weeks.

Descriptive statistics and inferential statistics with the aid of a statistical software called IBM SPSS (Statistical Product and Service Solution) were used to analyse the data collected.



Yamane Formula.

$$n = N / (1 + N(e)^2)$$

Where **n** is the sample size,

N is the population size which is 4,269 and

e is the level of precision. Taken to be **5%** in this study

Applying this formula, we get $n = 4269 /$

$$(1 + 4269(.05)^2)$$

$$= 4269 / (1 + 4269(.0025))$$

$$n = 365.73 = 366$$

The result is approximated to the nearest whole number. For example, for Lagos State University, the sample was $(712/4269) * 366 = 61.04$ this is approximate to 61.

The final summation of the sample size column resulted in 367. Since this figure is higher than the 366 from the Yamane formula it can represent the system adequately.

Table 3.1: Distribution of Samples in Strata

S/N	Institution	Number of Academic Staff		Sample
		N	Source	N
1	Lagos State University	712	Registry office	61
2	Lagos State University of Science and Technology	738	Ministry of Education	63
3	Lagos State University of Education	358	Registry office	31
4	Yaba College of Technology	713	Registry office	61
5	Caleb University	79	Ministry of Education	07
6	Anchor University	43	Ministry of Education	04
7	University of Lagos	1627	Ministry of Education	140
	TOTAL	4269		367

Source: Researcher (July 2022).

IV. DATA ANALYSIS AND DISCUSSION OF FINDINGS

Analysis of Hypothesis One

Hypothesis One: There is no significant effect of cognitive ergonomics on effectiveness of academic staff in selected tertiary institutions in Lagos State.

Table 4.1: Model Summary of Cognitive Ergonomics and Effectiveness of Academic Staff in Selected Tertiary Institutions in Lagos State.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.691 ^a	.477	.473	.5057

Predictors: (Constant), CE₃, CE₂, CE₁

Dependent Variable: Employee Effectiveness

Source: Survey (2022)

The table presents the result of the regression analysis on the second hypothesis. It indicates that a positive relationship ($R = 0.691$) exists between the study indicators of cognitive ergonomics and effectiveness of academic staff in selected tertiary institutions in Lagos State.

The result also shows that the Adjusted R-squared is 0.473 which means that, 47.3% of the variability of effectiveness of academic staff in selected tertiary institutions in Lagos State is

accounted for by the model, considering the number of predictor variables- Attention, Perception and Memory in the model. This result is statistically significant because the p-value of the result (0.000) is less than the 0.05 level of significance used for this study as shown in Table. This implies that there is a 0.000 probability of finding this sample regression, or a larger one if the actual population regression is zero. This study therefore rejected the null hypothesis and accepted the alternative hypothesis which states that there is a significant relationship between cognitive ergonomics and the effectiveness of academic staff in selected tertiary institutions in Lagos State.



Table 4.2: Analysis of Variance Result for Hypothesis One

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	81.018	3	27.006	105.604	.000 ^b
	Residual	88.738	347	.256		
	Total	169.756	350			

a. Dependent Variable: Employee Effectiveness
a. Predictors: (Constant), CE₃, CE₂, CE₁
Source: Survey (2022)

The ANOVA (Model) table presents the result from the test of the null hypothesis that, there is no significant relationship between cognitive ergonomics and the effectiveness of academic staff in selected tertiary institutions in Lagos State. The ANOVA table also shows that the computed F

statistic is 105.604, with an observed statistical significance level of $P = 0.000$ which is less than 0.05. The null hypothesis was rejected. This implies that cognitive ergonomics had a significant relationship with the effectiveness of academic staff in the selected tertiary institutions in Lagos State.

Analysis of Hypothesis Two

Hypothesis Two: Cognitive ergonomics does not have a significant effect on the performance of academic staff in selected tertiary institutions in Lagos State.

Table 4.3: Coefficients Table between Cognitive Ergonomics and Performance of Academic Staff in Selected Tertiary Institutions in Lagos State.

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.240	.110		11.258	.000
	CE ₁	.104	.041	.132	2.546	.011
	CE ₂	.336	.042	.468	7.965	.000
	CE ₃	.137	.046	.168	3.005	.003

a. Dependent Variable: Performance

Source: Survey (2022)

The table presents the **Coefficients** table between the selected indicators of Cognitive Ergonomics and the Performance of Academic Staff in Selected Tertiary Institutions in Lagos State. The table shows an evaluation of the standardized coefficients of cognitive indicators and their associated p-values for the indicator Attention ($\beta_{CE1} = .132, p < 0.011$); for Perception ($\beta_{CE2} = .468, p < 0.000$) and Memory ($\beta_{CE3} = .168, p < 0.003$). The results of the unstandardized coefficients of cognitive indicators ($\beta_{CE1}, \beta_{CE2}, \beta_{CE3}$ are statistically significant and can be used in predicting the performance of academic staff in selected tertiary institutions in Lagos state. A critical examination of the Table shows that all of the study indicators of Cognitive Ergonomics- Attention, Perception, and Memory were individually statistically significant.

V. DISCUSSIONS OF FINDINGS

The result of the first hypothesis above shows that there is a positive relationship between

cognitive ergonomics and the effectiveness of academic staff in selected tertiary institutions in Lagos State. The outcome of the tested hypothesis as identified earlier in Table 4.1 where $R = 0.691$, cognitive ergonomics and effectiveness are positively related as observed among academic staff in selected tertiary institutions in Lagos State. This result agrees with the outcome of the study of Kim, (2016), Virpi, *et al.* (2019), Virpi, *et al.* (2020).

The second hypothesis focused on the significance of three indicators of cognitive ergonomics namely- Attention, Perception, and Memory interface, and the performance of a knowledge-based system like the academia relevant to making judgments in data-based decision-making tasks. Hence, based on the standardized Coefficients (β) in Table 4.2 and since all three selected indicators are statistically significant, this study expected a contribution of 0.132% to academic staff performance in the selected tertiary institutions in Lagos State for every unit of attention input by the



respondents, assuming perception and memory are held constant. A 0.468%, contribution to academic staff performance for every unit of relevant and accurate perception of the respondents assuming attention and memory are held constant. And a 0.168% contribution to academic staff performance for every unit of Memory utilised assuming Attention and Perception are held constant. This is in convergence with the information-processing theory as identified by Caroline (2019). It shows that despite the ever-increasing information (during lectures and research) academics are required to process both the short-time or long-time ability to manipulate information, monitor it, and strategically use information retrieved in their memory through psychological components like attention, and perception, to contribute to their performance. This means the cognitive indicators of attention, perception, and memory have a proportional positive relationship with performance in this study area.

VI. CONCLUSION AND RECOMMENDATION

This study assessed cognitive ergonomics and effectiveness of the academic staff of selected tertiary institutions in Lagos State.

The study concluded that despite the ever-increasing information academic are required to process both the short-time or long-time ability to manipulate information, monitor it, and strategically use information retrieved in their memory through psychological components like attention, perception, to contribute to their level of effectiveness and their performance.

Thus, management should provide an effective framework in the ergonomics model that could promote competency and capability in the performance of academic staff and their environment.

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